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ABSTRACT

A study examined the effects of teacher questioning and student prediction (purpose-setting procedures) upon the reading comprehension of 188 students in grades 3 through 6. Thirty-two constructed-answer questions were developed for use with an article about kangaroos, written in an expository style and approximately 900 words in length. Half of the questions were textually explicit and half textually implicit. Subjects were divided into four groups that were (1) provided with no specific reading purposes in the form of questions or predictions (control); (2) asked to read a massed list of prequestions silently while the investigator read them aloud (prequestions only); (3) asked to read the prequestion list, but also directed to write answers to each question, individually (individual predictions); and (4) asked to answer orally each of the prequestions (group prediction). Results showed no difference between groups on total recall, but the prequestion groups did better on the cued information than did the control group. The control group did better on the non-cued information, however. Prequestions with predictions seemed to increase recall on cued information, without any additional narrowing of attention beyond that caused by the use of prequestions alone. (HOD)

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Predictions and the Limiting Effects of Prequestions

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Predictions and the Limiting Effects of Prequestions

Various purpose-setting procedures have been proposed for enhancing reading comprehension. The effects of these procedures have rarely been examined with elementary school age children, however. While this research approach has certain theoretical justifications, it has neglected the practical fact that these procedures are most commonly employed with children in that age group. This paper explores the specific effects of prequestions (questions provided prior to reading) upon the types of text information remembered by children in grades 3-6. This paper also attempts to explore the influence of a prediction strategy as an alternative to the use of prequestions alone as a purpose-setting device.

Basal readers and reading textbooks often indicate that teachers should provide children with specific purposes for reading (Aukerman, 1981; Harris & Sipay, 1985). Three types of purpose-setting strategies seem to be recommended most frequently. These are: (1) the teacher makes a simple

statement which tells the children what to find out from the text; (2) the teacher asks questions, and the children read to find answers to the questions; or (3) the teacher asks questions and the children predict or guess possible answers to these questions. The children then read to evaluate the accuracy of their guesses. This paper will examine the effects of the latter two strategies, questioning and predicting, upon comprehension.

Although both of these forms of purpose-setting are meant to enhance children's reading comprehension, they are based upon different philosophical and theoretical perspectives of learning. Questioning, as it is usually proposed, is teacher- or text-centered; that is, the teacher or text provides the rationale for reading. The use of such questions is intended to improve the reader's ability to access and to remember specific information from the text (Betts, 1946).

Predicting, on the other hand, is more reader-centered and it is inductive in nature. Predicting activity involves learners in the generation of predictions and in the active testing or evaluation of these predictions or hypotheses (Posner, 1973). Stauffer (1969) has theorized that self-generated purposes in the form of predictions would have a different impact upon comprehension than would those purposes imposed by a teacher or text. Readers, for instance, could be expected to initiate more thorough knowledge activation because of the generative nature of prediction. Also, because readers must find out why their hypotheses are right or wrong, it is possible that predictions would require a more generalized or complete reading of the passage.

A sizeable body of research has demonstrated the complex nature of the impact upon recall of purpose-setting questions (Tierney & Cunningham, 1984). Prequestions usually have been found to enhance the recall of question-relevant or cued information, to the detriment of the recall of question-irrelevant or non-cued information (Anderson & Biddle, 1975; Frase, 1968; Frase & Schwartz, 1975; Rothkopf & Bisbicos, 1967). Prequestions appear to narrow the reader's attentional focus, allowing more thorough processing of the question-relevant information than of other information in the text (Reynolds & Anderson, 1980; Reynolds, Standiford & Anderson, 1979).

Prequestion studies have usually focused upon the reading comprehension of older subjects. These studies have rarely examined the use of prequestions with students even as young as 10 or 11 years old (Memory, 1982). This omission is probably a result of the fact that children have usually been found to be less able than adults to employ selective attention strategies (Baker & Brown, 1984). For this reason, it is possible that prequestions would not have a positive impact upon children's recall. One study (Memory, 1982) analyzed prequestion effects upon the reading recall of middle school children (ages 10-13), and it concluded that prequestions influence children in this age group in the same way that they influence adults. Also, although younger children are not as flexible as adults in the use of attentional strategies, this ability is already beginning to develop by second or third grade (Baker & Brown, 1984; Markman, 1977; Markman, 1979). It is theoretically possible that prequestions would not influence younger children's recall, but it is with elementary grade level children that prequestions are used so frequently. Therefore, it seems reasonable to evaluate the implications of this widespread practice.

Despite the extensive research concerning prequestions, there have been very few studies, with subjects of any age level, of the effects of predictions upon reading recall. One such study (Peeck, 1971) found no differences in the "shape" of comprehension (i.e., differential impact on question-relevant and question-irrelevant information) for groups of college students who guessed or did not guess answers to multiple-choice prequestions. However, multiple-choice questions have been found to operate differently than answer-constructive questions in this paradigm (Anderson & Biddle, 1975).

Another study (Hammond, 1979) found that predictions led to higher recall for cued information, with no significant negative impacts upon the recall of non-cued information, for fifth graders. This study is difficult to interpret, however. First, the youngsters were all quite experienced with the prediction technique, and because of this it is possible that the treatment was actually more than just the questions described. Second, there was no control group. All subjects, in these two conditions, received prequestions. It seems possible that the prequestions might have had no real impact upon the comprehension of these children. Whether it did or not, it is impossible to discern whether the effect was due to differences in the difficulty of the two types of questions or to attentional shifting. Finally, because the predictions were given aloud in a reading group, it is difficult to determine whether the result was due to an increase in prior knowledge brought about by information sharing or to an increased depth of processing caused by prediction.

The specific objectives of this research were:

1) to determine whether prequestions or predictions contribute to total amount of information recalled by young children (grades 3-6);

2) to determine whether prequestions enhance the recall of question-relevant and question-irrelevant text information for young children;

3) to determine whether prequestions combined with predictions enhance the recall of question-relevant and question-irrelevant text information;

4) to compare the effects of predictions on the reading recall of children who predict alone (schema activation) with the recall of those who predict in group (schema sharing).

METHOD

Subjects

The subjects were 188 students in grades 3-6, attending a suburban elementary school. All subjects were reading at a "third grade level or above" according to their classroom teachers. Only English proficient subjects were included in the sample.

Materials

The text used for this study was an article about kangaroos which was written in an expository style (Lauber, 1965). The text was approximately 900 words in length. It was selected because it was written at a third grade readability level (Harris & Sipay, 1985); it contained much information about kangaroos not commonly known; and, it was similar to the material which appears in many basal readers with regards to content, length, and treatment.

A set of 32 constructed-answer questions was developed for use with this material. The article was subjectively divided into eight topical zones. For each zone, four questions were written using the Pearson & Johnson taxonomy

(1978). Two textually explicit and two textually implicit questions were written for each zone. This set of questions was used as the post-test measure.

Pre-reading questions were selected directly from the post-test. Two questions, one of each type, were randomly selected to represent each information zone on the pretest. In all, students answered 16 prequestions. Half of the post-test questions were cued (i.e., used as prequestions) and half were non-cued (i.e., not used as prequestions).

Procedures

Subjects were assigned, using stratified random sampling with respect to grade levels, to one of four treatment groups. Equal numbers of subjects (n = 47) were assigned to each group.

Group I: Control Group. Subjects in this group were provided with no specific reading purposes in the form of questions or predictions. These subjects were asked to read the article silently, and immediately after that they completed the post-test.

Group II: Prequestions only. Subjects in this group were asked to read a massed list of prequestions silently while the investigator read them aloud. Then they were asked to read the passage and to complete the post-test. These subjects were told that the prequestions would give them an idea as to what information was important to remember.

Group III: Individual Predictions. Subjects in this group were asked to read the prequestion list, but they were also directed to write answers to each question, individually. They were asked to guess when they did not know an answer. After writing answers to the 16 prequestions, these subjects read the passage and completed the post-test.

Group IV: Group Prediction. Subjects in this group were asked to generate answers to each of the prequestions orally. Students shared their predictions aloud in group. Not every student shared a prediction for each question, but each student heard at least three predictions per question. No judgments as to the accuracy of the predictions were made, and there were no attempts to achieve consensus. Subjects then were asked to read the passage and to complete the post-test.

ANALYSIS

Total numbers of questions answered and numbers of questions answered on each section of the post-test (cued-explicit; cued-implicit; non-cued explicit; non-cued implicit) were used as the dependent variables. Reading level, as measured by the SRA Reading Achievement Tests, contributed significantly to post-test performance and was used a covariate. Vector variables were created using effect coding (Kerlinger & Pedhazur, 1973) in order to represent planned orthogonal contrasts of treatment groups and question types. These vector variables were used as independent measures in a multiple regression analysis. Various orthogonal contrasts and two-way and three-way interactions among the experimental variables were entered into the regressions.

RESULTS

There was no difference in post-test performance between the control group and the combined purpose-setting groups with regards to total amount of recall ($R = .001$, F 1,748 = .29). An examination of the means of the four groups suggests, however, that the questions-only subjects and the group predictions subjects did not do as well as either the control subjects or the

individual predictions subjects. Thus, subjects who had neither questions or predictions did as well as those who had them, but the combination of the purpose-setting groups appears to have obscured real differences.

Insert Table 1 about here.

No differences in test performance were found when the questions-only subjects were compared with the combined individual- and group-predictions subjects ($\underline{R}$ = .004, $\underline{F}$ 1,747 = 2.27). Again, it appears that the combination of treatment group outcomes might have obscured important differences, as the scores for the two predictions groups are quite different.

A final planned contrast between groups compared the performances of the two prediction groups. It was found that individual predictions were more effective in enhancing recall than were the group predictions ($\underline{R}$ = .02, $\underline{F}$ 1,749 = 10.94, $\underline{p}$ <.01). Students who predicted individually did about 10% better on the test than did those who shared their predictions aloud.

Performance on cued and non-cued questions was compared, also. Non-cued questions were found to be easier than were cued questions ($\underline{R}$= .02, $\underline{F}$ 1,745 = 20.90, $\underline{p}$ <.01). However, this was probably due to sampling differences in the question distributions. For this reason, the interaction of groups with cued and non-cued question types was made. It was found that the groups did not perform equally well on these two question types ($\underline{R}$ = .01, $\underline{F}$ 12,739 = 10.61, $\underline{p}$ <.01).

The interaction vectors indicated that the control group did better than the combined experimental groups on the non-cued questions, but that the experimental groups were superior on the cued information (R = .01; F 1,741 = 7.26, p <.01). It was found that there was no significant difference between the questions-only group and the combined prediction groups with regard to the non-cued information, but the prediction groups were superior on the cued information (R = .01, F 1,740 = 3.26). There was no significant interaction effect with regard to cued and non-cued recall for the two prediction groups (R = .001, F 1,739 = .09).

Textually explicit questions were found to be easier than textually implicit questions (R = .10, F 1,746 = 68.73, p < .01). There were no significant interactions, however, between question-types (textually explicit, implicit) and treatment groups, between question-types and cueing, or between question-types, cueing and groups.

DISCUSSION

As in studies with adults, prequestions were found to exercise no significant impact upon the total amount of recall of children. The influence of prequestions in this study might have been limited in that they were massed at the beginning of the passage, rather than interspersed throughout (Tierney & Cunningham, 1984). Massed questions place great memory demands upon children (Memory, 1982). As in the adult studies, any gains due to cueing seem to have been balanced by the narrowed focus of attention. That is, there was no difference between groups on total recall, but the prequestions groups did better on the cued information than did the control group. The control

group did better on non-cued information, however. Thus, even though children lack the attentional flexibility of adults, and massed questions may have limited effectiveness, prequestions seem to operate on children's recall in much the same way that they do on the recall of adults. It is possible that the use of prequestions and predictions during reading instruction provides children with an important opportunity for developing this flexibility.

Not all purpose-setting activities were found to be equivalent. The predictions groups were superior to the questions-only group on cued information, while these groups performed equally well on the non-cued information. These findings are identical to Hammond's (1979), but the use of a control group in the comparison reveals that contrary to Hammond's interpretation, predictions do not seem to overcome the narrowing influence of prequestions.

Nevertheless, prequestions with predictions did seem to increase recall on cued information, without any additional narrowing of attention beyond that caused by the use of pre-questions alone. The depth of processing of the prediction groups seems to have increased. The cued recall of prediction groups was better than the cued recall for the control group or the questions-only group. This depth of processing effect was also demonstrated by the fact that the individual predictions group did slightly better than the other three groups on total recall. This might be due to the fact that predictions require a more thorough activation of prior knowledge or a greater depth of processing than do questions alone.

Future research needs to explore the influence of predictions in a variety of experimental conditions. The effect of predictions needs to be

tested with massed and interspersed questions, and with questions better designed to tap the use of prior knowledge during reading such as Pearson & Johnson's (1978) scriptally implicit questions. Finally, the impact of training on the use and effectiveness of predictions over time should be examined in order to find out whether the power of predictions can be maintained or transferred to other situations. It is one thing to find that prediction strategies enhance comprehension of a passage, but does the use of such strategies in school settings lead to improved comprehension of other passages in other situations? Until such studies are carried out, however, directing children's reading with questions and predictions seems to be a more reasonable strategy than the use of questions alone.

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Table 1. Means and standard deviations of control group (n=47), question only group (n=47), individual prediction group (n=47), and group prediction group (n=47) on post reading questions

	Control	Questions Only	Individual Predictions	Group Predictions	Total
	$\bar{X}$ / SD	$\bar{X}$ / SD	$\bar{X}$ / SD	$\bar{X}$ / SD	$\bar{X}$ / SD
CUED-QUESTIONS	7.51/3.11	7.06/3.02	8.89/3.36	7.70/3.26	7.79/3.21
NON-CUED QUESTIONS	9.83/3.06	8.55/3.10	9.38/2.83	7.98/3.32	8.92/2.83
TEXTUALLY EXPLICIT	9.72/3.03	8.77/3.40	10.26/2.92	8.89/3.41	9.42/3.22
TEXTUALLY IMPLICIT	7.62/3.25	6.85/2.96	8.02/3.00	6.79/3.12	7.33/3.12
TOTAL	17.34/5.75	15.62/5.71	18.28/5.51	15.68/6.21	16.73/5.85